Harry Craig

02/23/2001 06:30 PM

To: Kevin Mayer/R9/USEPA/US@EPA
cc: CRAIG THOMAS/R5/USEPA/US@EPA, Debra Tellez/R6/USEPA/US@EPA, olah@speagle.com
Subject: Re: perchlorates

Kevin,

I wanted to give you and Laura a response on the questions related to propellants. There are four basic types of propellants: 1) single base, 2) double base, 3) triple base, and 4) composite. Single, double, and triple base propellants are generally used in small arms ammunition, mortars, and artillery. Composite propellants are generally used in rocket motors and missiles.

Single base propellants are essentially pure nitrocellulose (NC), with about 1% added stabilizer, usually diphenylamine. Double based propellants also contain NC, but add a 2nd energetic material, usually nitroglycerin (NG), and 1% stabilizer (ethyl centralite) and 3%-5%plasticizers (dibutyl phthalate or diethyl phthalate). Several double base propellants also contain up to 10% dinitrotoluene (DNT). Triple base propellants add a 3rd energetic material, nitroguanidine (NQ) in addition to NC and NG, along with similar stabilizers and plasticizers as in the double base propellants.

The reference to "rocket paste area" I believe refers to part of the manufacturing process for single, double, or triple based propellants. Solvents are mixed with propellant ingredients and then extruded (similar to a pasta maker) to get specific sizes and shapes for the propellants, which affect the ballistic properties of how they function in a gun barrel.

Composite propellants usually contain oxidizers and binder/fuel, and are cast as a single solid mass. Typical oxidizers singlely or in combination are ammonium perchlorate, potassium perchlorate, RDX, or HMX. Binders are usually plastic, rubber or polymer materials, such as polyisobutylene, polyurethane rubber, or polyvinyl chloride. Several common perchlorate based propellant binders are hydroxyterminated polybutadiene (HTPB) or carboxyterminated polybutadiene (CTPB). Newer weapons systems tend to use more plasticized perchlorate, RDX, or HMX as the primary energetic propellant materials. Some of the new gun propellants are composite based propellants, but most are still single, double, or triple based propellants.

Another major use of perchlorates besides rocket/missile propellants are military pyrotechnic devices such as flares, colored smoke grenades, photo flash bombs and Jet Assisted Take Off (JATO) bottles. Some fireworks also contain perchlorates as oxidizers. These types of items are oftened disposed of by burning at military OB/OD grounds. I think that is one the reasons we are seeing an increase in perchlorate at OB/OD sites, particularly ones used since about the 1960's.

Regards,

Harry

Kevin Mayer

Kevin Mayer

02/22/2001 11:52 AM

To: Laura Olah <olah@speagle.com>
cc: CRAIG THOMAS/R5/USEPA/US@EPA, Harry Craig/R10/USEPA/US@EPA, Debra Tellez/R6/USEPA/US@EPA
Subject: Re: perchlorates

Laura -

We are still trying to put together a coherent picture of perchlorate occurrence in the environment. One of the challenges has been very spotty information sources since relatively few facilities - federal or private - have actually sampled for perchlorate. As the toxicity of perchlorate becomes better defined, the necessity for more extensive sampling will become more apparent.

Even with a paucity of information, a picture is emerging that perchlorate often can be detected at Explosive Ordnance Disposal facilities (Open Burn/Open Detonation) along with other residual chemicals. This seems to be the case at some facilities where solid propellant was not otherwise handled, tested or disposed. If there was any solid propellant testing, machining or decommissioning at Badger, then the chance of perchlorate release increases. Most of our effort, especially here in the southwest US, has been focused on large manufacturing and rocket testing and refurbishing facilities.

I rely on other experts in EPA to explain to me terms such as "single- double- and triple-based propellants" and "rocket paste", and if I can find out the relevance of these activities to perchlorate I will certainly let you know.

Several years ago my family vacationed near Devils Lake and attended a festival in Sauk City. Badger makes a large impression on the drive south from Devils Lake.

Please feel free to contact me if you have further questions.

Kevin Mayer

Dear Kevin,
I'm told you are the perchlorate "guru" for the EPA. Did you know this? (smile)

We live near a military base and are trying to establish the potential for perchlorate contamination.

I understand that perchlorate is principally found in rocket fuel oxidizers but that it is also found in certain munitions and other sources. The nearby base is Badger Army Ammunition Plant; they produced single- double- and triple-based propellants. One of the contaminated areas in Badger is known as the rocket paste area. Principal contaminants in soils that have been identified by the Army are metals and explosives (principally DNTs).

Also, I'm not certain what the difference is between rocket fuel and rocket propellants is or might be -- any info in this regard would be helpful.

Thanks in advance for your assistance.
Laura

Laura Olah <olah@speagle.com>

Laura Olah
<olah@speagle.com>
02/22/2001 10:36 AM

To: Kevin Mayer/R9/USEPA/US@EPA
cc:
Subject: perchlorates

Dear Kevin,
I found your name at http://www.zerowasteamerica.org/Perchlorate.htm
I'm looking for information about the presence of perchlorate contamination at military bases.
I next to the Badger Army Ammunition Plant and am wondering if we should be testing for perchlorates here. Has perchlorate ONLY been found as a contaminant at military bases where solid rocket fuel was produced or has it shown up at other sites? What are other potential sources besides solid rocket fuel disposal??
thanks!
Laura
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Laura Olah, Executive Director
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